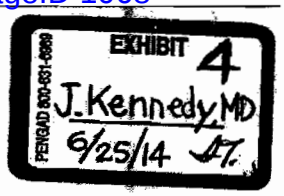
EXHIBIT I

Smith, *Anesthesia for Infants and Children,* 8th Edition, Exhibit 4 to Deposition of Jason Kennedy, M.D.



From: Smith's Anesthesia for Infants and Children , Eighth Edition

Capnography in pediatric anesthesia is used to confirm placement of an endotracheal tube in the correct tracheal position and to continuously assess the adequacy of ventilation. Capnography also provides information about the respiratory rate, breathing pattern, endotracheal tube patency, and, indirectly, degree of neuromuscular blockade. Capnography can assist with the diagnosis of metabolic and cardiovascular events and can provide an early warning of a faulty anesthesia delivery system. In pediatric patients, an abnormal increase in **end-tidal carbon dioxide tension (P_{ETCO_2}) most commonly signifies hypoventilation**, but, rarely, it also indicates the presence of increased CO_2 production, as occurs with temperature elevation or as an early sign of malignant hyperthermia. On the other hand, an abnormally low P_{ETCO_2} may indicate an increase in dead space or suggest a state of low pulmonary perfusion. Sudden absence of the capnographic tracing indicates a breathing circuit disconnection, and the abnormal presence of inspired CO_2 signifies the presence of a faulty unidirectional valve, an exhausted CO_2 absorber, or, when a semiopen circuit is being used, rebreathing secondary to an insufficient fresh gas flow.

Postanesthetic recovery

The postanesthetic recovery **period is a time of high risk for pediatric patients**. A large percentage of otherwise healthy infants and children (20% to 40%) develop oxygen desaturation (SpO_2 = 94%) during transport and on arrival at the PACU (Patel et al., 1988). Oxygen desaturation occurs sooner, is more pronounced, and has a longer duration in infants than in children and a longer duration in children than in adults (Xue et al., 1996). Postoperative hypoxemia is most likely caused by atelectasis, but upper airway problems such as **obstruction**, croup, and laryngospasm, are more likely in children (4% to 5%) than adults (Cohen et al., 1990). **All children, therefore, should be administered oxygen supplementation during their transport from the operating room and on arrival at the PACU, until they can maintain satisfactory oxygen saturation in room air or at their baseline Fio_2**. Nausea, vomiting, temperature instability, and postoperative pain also require prompt and effective treatment to ensure patient comfort and efficient discharge timing.

Initial Care

On arrival at the PACU, **the anesthesiologist** confirms the patency of the patient's airway, assesses the adequacy of ventilation, and ensures the supply of humidified oxygen. **The anesthesiologist** records the heart rate, respiratory rate,

blood pressure, SpO_2, and temperature, which are reported to the nurse. The **anesthesiologist then gives** a report to the nurse concerning the child's condition, special problems related to any underlying illnesses, the events of the surgery, the anesthetic technique used, and medications given. The **anesthesiologist should remain at the bedside until the child is reasonably stable and well attended.**

With most currently used general anesthetic techniques, awakening occurs within a few minutes of the conclusion of surgery. Unfortunately, no one technique guarantees a smooth emergence, and agitation may occur in the early recovery period. **Agitation may be caused by** numerous factors, including emergence delirium caused by anesthetic agents, pain, metabolic disturbances (e.g., hypothermia, hyperthermia, hypoglycemia, hyponatremia), neurologic disturbances, a behavioral response to sudden awakening in a strange environment; separation anxiety, **airway obstruction with resultant hypoventilation and hypoxia,** and combinations of these factors. As discussed at the beginning of this chapter, a pediatric anesthesiologist should plan the general anesthetic approach to minimize or avoid many of these factors.

Airway Obstruction

Although patients **should be able to maintain airway patency before leaving the operating room, it is not uncommon for an infant or a child to have an obstruction after the stimulation of extubation and transportation has subsided. The anesthesiologist must be acutely aware of any changes in the breathing pattern at this time, because hypoventilation can lead to a reaccumulation of volatile agents in the alveoli that can further blunt the respiratory drive. Hypercarbia may result in dysrhythmias and hypertension, and hypoxemia in infants may lead to further suppression of breathing** ( ). Neck extension, mouth opening, and jaw thrust alone or together may be enough to correct the problem. Nasopharyngeal airways, if necessary, are better tolerated than oropharyngeal airways in this setting. If obstruction continues, reassessment of anesthetic and neuromuscular blockade reversal should be conducted and possible reintubation may be considered.

Patients with obstructive sleep apnea syndrome (OSA) **are predisposed to postoperative apnea** (see Chapter 24, Anesthesia for Pediatric Otorhinolaryngologic Surgery). OSA is characterized by prolonged partial and/or intermittent complete upper airway obstruction that disrupts normal breathing and sleeping patterns (American Thoracic Society, 1996). Although OSA in adults is commonly associated with obesity, in children it more often arises from enlarged tonsils and adenoids (Young et al., 1993)

Children with OSAS tend to emerge from anesthesia more slowly than children without OSAS. This may be explained by their deficit in sleep arousal mechanisms. They seem to have elevated sleep arousal mechanisms in response to hypercarbia and increased upper airway obstruction ( ). Other subtle disturbances of sleep architecture may also be present (Bandla et al., 1999).

Children with **hypertrophic tonsils and adenoids tend to have increased airway obstruction in the immediate postoperative period**. The presence of blood and secretions in the pharynx and larynx may provoke upper airway reflexes, leading to laryngospasm. These patients **tend to become hypoxemic more often and perhaps more severely during the first several hours after surgery than patients undergoing procedures not involving the upper airways** (Motoyama and Glazener, 1986).

Children with OSAS have a higher incidence of postoperative respiratory complications, including prolonged oxygen requirements, airway obstruction requiring nasal airway, and major respiratory compromise requiring airway instrumentation, than children without OSAS (Biavati et al., 1997; Wilson and Robertson 2002).